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Mitsubishi Electric Corporation Industrial Robot

MELFA Technical News

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Subject **Precautions for Replacing RH-3CH-D/6CH-D with RH-3CRH-D/6CRH-D**

Applicable to: **RH-3CH4018-1D-S11, RH-6CH6020-1D-S11, RH-6CH7020-1D-S11**
RH-3CRH4018-D, RH-6CRH6020-D, RH-6CRH7020-D

Thank you for your continued support of Mitsubishi Electric industrial robot "MELFA".

This document provides the details of precautions for replacing **RH-3CH-D/6CH-D** horizontally articulated robots with the **RH-3CRH-D/6CRH-D**.

Contents

Precautions for Replacing RH-3CH-D/6CH-D with RH-3CRH-D/6CRH-D

1. Model configuration (replacement models)

The following tables show the models and robot controllers for replacing the RH-3CH-D/6CH-D with the RH-3CRH-D/6CRH-D.

Model	Robot controller
RH-3CH-D	CR751-D
RH-6CH-D	CR751-D

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Model	Robot controller
RH-3CRH-D	CR800-D
RH-6CRH-D	CR800-D

2. Specifications comparison

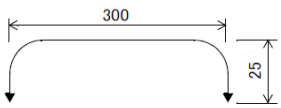
2.1 Robot arm specifications

The following table shows the comparison of robot arm specifications between existing and new models.

Type		Unit	Specification value					
			Existing model (CH series)			New model (CRH series)		
Model			RH-3CH4018-1D-S11	RH-6CH6020-1D-S11	RH-6CH7020-1D-S11	RH-3CRH4018-D	RH-6CRH6020-D	RH-6CRH7020-D
Payload		kg	Maximum: 3 (rated: 1)	Maximum: 6 (rated: 2)		Maximum: 3 (rated: 1)	Maximum: 6 (rated: 2)	
Arm length	Arm No. 1	mm	225	325	425	225	325	425
	Arm No. 2		175	275		175	275	
Maximum reach	Reach	mm	400	600	700	400	600	700
Operating range	J1	deg	264 (±132)	264 (±132)		264 (±132)	264 (±132)	
	J2		282 (±141)	300 (±150)		282 (±141)	300 (±150)	
	J3		180	200		180	200	
	J4		720 (±360)	720 (±360)		720 (±360)	720 (±360)	
Position repeatability	X-Y composite	mm	±0.01	±0.02		±0.01	±0.02	
	J3 (Z)		±0.01	±0.01		±0.01	±0.01	
	J4 (θ)	deg	±0.01	±0.01		±0.01	±0.01	
Maximum speed Note 1	J1	deg/sec	720	420	360	720	420	360
	J2		720	720		720	720	
	J3 (Z)	mm/sec	1100	1100		1100	1100	
	J4 (θ)	deg/sec	2600	2500		2600	2500	
	J1 + J2	mm/sec	7200	7800		7200	7800	
Cycle time Note 2		sec	0.44	0.41	0.43	0.44	0.41	0.43
Permissible moment	Rating	$kg \cdot m^2$	0.005	0.01		0.005	0.01	
	Maximum		0.05 (0.075)	0.12 (0.18)		0.05 (0.075)	0.12 (0.18)	
Robot weight		kg	14	17	18	14	17	18
Hand I/O piping			D-sub 15 pins / φ6 × 2, φ4 × 1			D-sub 15 pins / φ6 × 2, φ4 × 1		
Robot controller			CR751-D			CR800-D		

Note 1) The value is one when the robot is in MvTune2 (high-speed operation mode).
Additionally, the value is one under load conditions where no effect comes from automatic speed compensation due to the load mass.

Note 2) The value is one when the robot is in MvTune2 (high-speed operation mode) under the following conditions and operations.
・The cycle time may take longer depending on the position the robot is moving to or if the workpiece needs to be positioned more accurately.



<Conditions>
Load: 2 kg

2.2 Robot controller specifications

Note that the replacement requires a new model of robot controller, and specifications such as external dimensions will be changed. For details, refer to the following table.

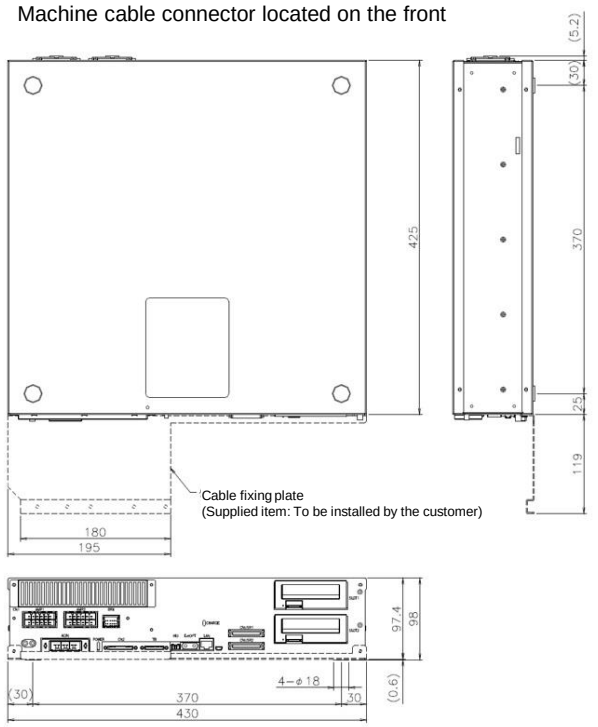
Item		Unit	Specification value	
			Existing model (CH series)	New model (CRH series)
Robot controller model			CR751-D	CR800-D
Number of axes			Four axes at a time	Four axes at a time
Memory capacity	Number of teaching positions	Point	39,000	39,000
	Number of steps	Step	78,000	78,000
	Number of programs	Program	512	512
Programing language			MELFA-BASIC IV, V	MELFA-BASIC V, VI
Position teaching method			Teaching or MDI	Teaching or MDI
External I/O (standard)	I/O	Point	Input: 0 (up to 256), output: 0 (up to 256)	Input: 32 points, output: 32 points
	Dedicated I/O		Assigned to general-purpose I/O	Assigned to general-purpose I/O
	Hand I/O		Input: 8, output: 8	Input: 8, output: 8
	Emergency stop input		1 (redundant)	1 (redundant)
	Emergency stop output		1 (redundant)	1 (redundant)
	Mode selector switch input		1 (redundant)	1 (redundant)
	Mode output		1 (redundant)	1 (redundant)
	Robot error output		1 (redundant)	1 (redundant)
	Additional axis synchronization output		1 (redundant)	1 (redundant)
	Door switch input		1 (redundant)	1 (redundant)
	Encoder input		-	2
Interface	Additional axis interface	Channel	1	-
	Additional axis, force sense interface	Channel	-	1
	Remote I/O	Channel	-	1
	USB	Port	1	1
	Ethernet	Port	1 (100BASE-TX/10BASE-T)	1 (1000BASE-T/100BASE-TX/10BASE-T for the user)
			-	1 (100BASE-TX/10BASE-T for the teaching pendant)
	Option slot	Slot	2	2
	Tracking interface	Channel	2	-
	SD memory card slot	Slot	-	1
	RS-422	Port	1	1
Power supply	Input voltage range	V	Single-phase 180 to 253 V AC	Single-phase 200 to 230 V AC
	Power capacity	kVA	0.5	0.5
	Power supply frequency	Hz	50/60	50/60
External dimensions		mm	430 (width) × 425 (depth) × 98 (height)	430 (width) × 425 (depth) × 99.5 (height)
Weight		kg	Approx. 12	Approx. 12.5
Structure [IP rating]			Freestanding type, open structure, vertical/horizontal installation [IP20]	Freestanding type, open structure, vertical/horizontal installation [IP20]

2.3 External dimensions of robot controllers

The external dimensions of the robot controller will be changed. (Left drawing: A robot controller for the RH-3CH-D/6CH-D, right drawing: A robot controller for the RH-3CRH-D/6CRH-D)

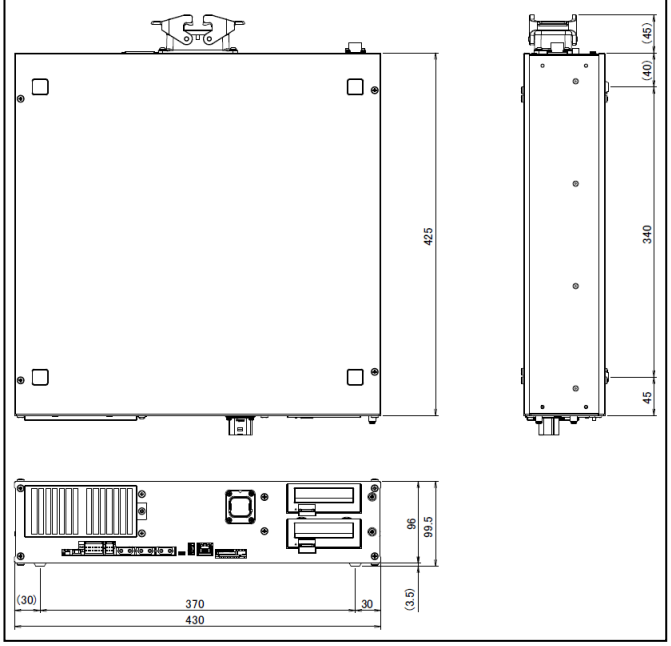
■ Existing model: CR751-D

Machine cable connector located on the front



■ New model: CR800-D

Machine cable connector located on the back



2.4 Comparison between options

○: Compatible, ×: Not compatible

Item	Existing model (CH series)	New model (CRH series)	Specifications and supplementary information	Compatibility
Machine cable (replacement)	1F-□□UCBL-04	1F-□□UCBL-42	Fixed type	×
	1F-□□LUCBL-04	1F-□□LUCBL-42	Flexible type	×
Simple teaching pendant	R33TB	R32TB	Cable length: 7 m	×
	R33TB-15	R32TB-15	Cable length: 15 m	×
High-performance teaching pendant	R57TB	R56TB	Cable length: 7 m	×
	R57TB-15	R56TB-15	Cable length: 15 m	×
Parallel I/O interface	2D-TZ368 (sink type)/ 2D-TZ378 (source type)	2D-TZ368 (sink type)/ 2D-TZ378 (source type)	Input: 32 points, output: 32 points Insulated output signal Insulated input signal	○
External I/O cable (for the parallel I/O interface)	2D-CBL05	2D-CBL05	5 m	○
	2D-CBL15	2D-CBL15	15 m	○
Parallel I/O unit	2A-RZ361 (sink type)/ 2A-RZ371 (source type)	2A-RZ361 (sink type)/ 2A-RZ371 (source type)	Input: 32 points, output: 32 points Insulated output signal Insulated input signal	○
External I/O cable (for the parallel I/O unit)	2D-CBL05	2D-CBL05	5 m	○
	2D-CBL15	2D-CBL15	15 m	○
CC-Link interface	2D-TZ576	2D-TZ576	Only supported with intelligent device stations and local stations	○
Network base card (EtherNet/IP interface)	2D-TZ535	2D-TZ535	HMS Anybus CompactCom Module-connecting communication interface	○
Network base card (PROFINET interface)	2D-TZ535-PN	2D-TZ535-PN	HMS Anybus CompactCom Module-connecting communication interface	○
Network base card (CC-Link IE Field interface)	2F-DQ535	2F-DQ535	HMS Anybus CompactCom Module-connecting communication interface	○
Network base card (Ether CAT interface)	-	2F-DQ535-EC	HMS Anybus CompactCom Module-connecting communication interface	-
Function extension card	-	2F-DQ510	MELFA Smart Plus function added Note 1	-
	-	2F-DQ520		-
	-	2F-DQ511		-
	-	2F-DQ521		-
Safety option	-	4F-SF002-01	Devices required for safety functions	-
SD memory card	-	2F-2GBSD	Memory card capacity: 2 GB	-
RT Tool Box	3D-11C-WINJ	3F-14C-WINJ	CD-ROM	×
	3D-12C-WINJ (mini version)	3F-15C-WINJ (mini version)	CD-ROM	×
	-	3F-16D-WINJ (Pro version)	DVD-ROM	-

Note 1)

・When using the preventive or predictive maintenance function after the robot controller software has been updated from an unsupported version, the calculated wear ratio will not be correct as the wear ratio will not have been calculated during the time that the unsupported software version was used.

・Use a robot arm and robot controller in a correct combination because the wear ratio of the robot arm is saved in the robot controller.
If replacing either one of the robot arm or robot controller, back up and restore preventive and predictive maintenance data to be used after the replacement.

3. Compatibility

The following tables show the compatibility between existing and new models.

3.1 Robot arm compatibility

○: Compatible, ×: Not compatible

Classification	Item	Specifications		Compatibility
		Existing model (RH-CH series)	New model (RH-CRH series)	
Appearance	Installation dimensions	Same		○
	Mechanical interface	Same		○
	Operating range	Same		○
End-of-arm tooling	Hand wiring	Same		○
	Hand piping	Same		○
	Spare wiring	Same		○
Maintenance	Backup battery	Same		○

3.2 Robot controller compatibility

Item	Specifications		Compatibility	Remarks
	Existing model (RH-CH series)	New model (RH-CRH series)		
	CR751-D	CR800-D		
Teaching pendant	R33TB	R32TB	×	The R33 or R57TB can be connected to the CR800 using an optional conversion cable (3 m).
High-performance teaching pendant	R57TB	R56TB	×	
Battery	Equipped	Not equipped (replacement not required)	-	
Power cable	CR751 dedicated cable	CR800 dedicated cable	×	
CNUSR connector	Solder type	Cable insertion type	×	
Mode selector input	Available (To be supplied by the customer)	Available (To be supplied by the customer) Recommended key switch Model: HA1K-2C2A-2 (manufactured by IDEC)	×	
Enabling device switch	Available	Not available	×	

3.3 Notes on software

Item	Specifications	
	Existing model (RH-CH series)	New model (RH-CRH series)
	CR751-D	CR800-D
Control cycle	7.1 ms	3.5 ms
Robot language	MELFA-BASIC IV, V	MELFA-BASIC V, VI (upward compatible with MELFA-BASIC V) * The description used with V can be used as is for VI unless Function or Include is used with VI.)

3.4 Other notes

Item	Specifications	
	Existing model (RH-CH series)	New model (RH-CRH series)
	CR751-D	CR800-D
Dummy teaching pendant connector	Required	Not required (While the enable switch is on, the connector can be removed even during operation.)
Model settings	- (Model settings are not required because the robot controller is exclusive to the robot model.)	At the initial connection of a robot, the common robot controller automatically selects the robot model.
Mechanism production No.	Input required	Input not required (recorded in the mechanism ROM)
Origin setting	Input required	Input not required (recorded in the mechanism ROM)
Hand type	Sink (default) If using source type, change the settings.	Not set (default). Set sink or source type. (No setting will cause an error during hand operation.)
Serial No. settings	Required	Not required (The serial No. does not need to be set by the customer.)
Origin data sheet	Provided	Not provided (The origin does not need to be set by the customer.)
Information on China RoHS	Provided	Not provided (It is included in the Instruction Manual CD-R.)
Safety manual	Provided	Not provided (It is included in the Instruction Manual CD-R.)